

REMARKS

Claims 1-3, 5-13 and 15-19 were rejected in the Office Action. Claims 1, 6-8, 13, 16-19 have been currently amended and claims 21 and 22 are new. Claims 4, 14, and 20 are cancelled. Claims 1-3, 5-13, 15-19, and 21-22 are thus currently pending in the application.

I. U.S. PATENT APPLICATION PUBLICATION NO. 2005/0178662 (“WURCZINGER”) IS NOT PRIOR ART UNDER 35 U.S.C. 102 OR, THEREFORE, 103

For the rejection of claims 1-3, 5-13 and 15-18, the Office Action relies upon, at least in part, U.S. Patent Application Publication No. 2005/0178662 (“Wurczinger”). However, the Wurczinger reference was not published until August 18, 2005, over one year *after* the filing date of the present application. “U.S. patent application publications are prior art under 35 U.S.C. 102(a) and 102(b) as of the publication date.” MPEP 901.03. Since the publication date of Wurczinger is not until after the filing date of the present application, Applicants respectfully request the rejection of these claims be withdrawn.

To the extent that the Office Action intends to rely upon 35. U.S.C. 102(e) as the basis of the rejection, Applicants respectfully submit that all requirements of 102(e) must be met. “[A] U.S. patent application publication of a National Stage application and a WIPO publication of an international application under PCT Article 21(2) are considered to be prior art under 35 U.S.C. 102(e) as of the international filing date, or an earlier effective U.S. filing date, only if the international application was filed on or after November 29, 2000, designated the United States, **and was published under PCT Article 21(2) in English.**” MPEP 901.03 (bolding added). Applicants understand that that PCT/DE03/00903 was filed and published in German and, therefore, would not meet the requirements of 102(e).

Since the cited Wurczinger is not prior art, Applicants submit that no further response is necessary to the rejection of claims 1-3, 5-13 and 15-18. To the extent that the Applicants include claim amendments, remarks and arguments, Applicants do so without any admission that such amendments, remarks and arguments are necessary to overcome the Office Action. Instead, Applicants submit that the current amendments, remarks and arguments are only to advance prosecution.

II. WURCZINGER DOES NOT TEACH OR SUGGEST “THE POWER COUPLER POSITIONED CLOSER, MEASURED ALONG THE AXIS OF THE SHAFT, TO A CENTER OF THE VACUUM CHAMBER THAN THE AT LEAST ONE BEARING”

Independent claims 1 and 13 have been amended to recite “the power coupler positioned closer, measured along the axis of the [shaft/rotatable magnetron], to a center of the vacuum chamber than the at least one bearing” where the at least one bearing is “a closest bearing, measured along an axis of the [shaft/rotatable magnetron], to a center of the vacuum chamber”. Support for these amendments can be found in, at least, Figures 10-11 and paragraphs [0042]-[0044] of the present application. Wurczinger does not suggest or teach such limitations.

Wurczinger does not teach or suggest positioning a power coupler closer to the center of the vacuum chamber than a closest bearing. For limitations related to the position of the power coupler for claims 1-3, 5-13 and 15, the Office Action points to Wurczinger’s current feed 23. See Office Action ¶ 2. The current feed 23 in Wurczinger, however, is positioned directly over Wurczinger’s bearing arrangement 16. This is not the same as “the power coupler [being] positioned closer, measured along an axis of the [shaft/rotatable magnetron], to a center of the vacuum chamber than [a closest bearing]” as recited in amended claims 1 and 13. Moreover, by

positioning the current feed 23 directly over the bearing arrangement 16, Wurczinger is not “limit[ing] the current that flows through [a closest bearing]” as is recited in claim 1 and 13.

Wurczinger is not a prior art reference under 35 U.S.C. 102 or 103. In addition, Wurczinger does not teach each and every limitation of independent claims 1 and 13. Applicants respectfully submit that independent claims 1 and 13 are valid and allowable. Claims 2-3, 5-12 and 15 are thus allowable at least by virtue of their depending from an allowable independent claim.

III. NEITHER WURCZINGER, TOKI, NOR THE COMBINATION OF WURCZINGER AND TOKI, TEACH, SUGGEST OR RENDER OBVIOUS A LIQUID-METAL CONNECTOR POSITIONED BETWEEN A CLOSEST BEARING AND A ROTATABLE TUBE

A. The Position of a Liquid-Metal Connector for Claims 11, 16 and 18 is Non-Obvious Over Wurczinger and Toki

Independent claim 16 has been amended to recite “a liquid-metal electrical connector positioned between the at least one bearing and the rotatable tube” wherein the at least one bearing is “a closest bearing, measured along an axis of the shaft, to the first side of the vacuum chamber”. Support for this amendment can be found in, at least, Figures 10-11 and paragraphs [0036] and [0042]-[0044] of the present application.

The Office Action rejects claims 11, 16, and 18 under 35 U.S.C. 103(a) as being unpatentable over Wurczinger in further view of Japanese Patent Publication No. 01305523 (“Toki”). As an initial matter, the rejection is improper because it relies upon the Wurczinger reference which is not prior art under 35 U.S.C. 103. *See* Section I, above. In addition, Applicants respectfully traverse the rejection because Wurczinger and Toki do not teach or suggest positioning a power coupler, or a liquid-metal connector, closer to the vacuum chamber than a closest bearing.

For limitations related to the position of a power coupler, the Office Action points to Wurczinger's current feed **23**. *See, e.g.*, Office Action ¶ 9, p. 9. As discussed in Section II above, Wurczinger does not teach or suggest a power coupler (or liquid-metal connector) positioned closer to the vacuum chamber than a closest bearing. Instead, Wurczinger teaches positioning the current feed **23** directly on bearing arrangement **16**. Claims 11, 16 and 18 are therefore believed to be valid and allowable, at least for this reason.

In addition, Applicants dispute that Toki's bearing case **2** is the same as Applicants' liquid-metal electrical connector. In the Office Action, Toki's bearing case is pointed to as teaching Applicants' liquid-metal connector. *See* Office Action, pp. 3 and 9. Applicants respectfully disagree. As described in paragraph [0036] of the present application, Applicants' liquid-metal connector "use[s] liquid metal, such as mercury, bonded to the contacts to form the electrical connection." This is different than Toki's bearing case **2** in which the liquid metal is pooled rather than bonded. This is evidenced by Toki's disclosures of a mercury feed valve **12** and a mercury discharge valve **13**. Since claims 11, 16 and 18 all recite a liquid-metal connector, and since Toki does not disclose Applicants' liquid metal connector, these claims are believed to be valid and allowable, at least for this additional reason.

Applicants further dispute that a POSITA would be motivated to combine Wurczinger and Toki. The Office Action states that "[i]t would have been obvious to one of ordinary skill in the art to use the mercury connector taught in Toki as the power coupler in Wurczinger in order to gain the advantage of decreased resistivity and thus loss of power, between the bearing and the cathode." *See* Office Action pp. 8-10. But since it would not be clear to a person of ordinary skill in the art ("POSITA") that the fluid tube **11** actually rotates, there would be no perceived benefit of using Toki in combination with Wurczinger. Although Wurczinger shows bearing

arrangements 16 and 17, the purpose of these bearing arrangements is not clear. In Figure 2 of Wurczinger the fluid tube 11 does not appear to be rotatable. Instead, the fluid tube 11 appears to have a fixed connection with fluid outflow 5. Moreover, in Figure 3 of Wurczinger, the fluid tube 11 shows no rotational connection with flange 31 or tube cathode 2 and provided no indication as to why fluid tube 11 need to be rotated, especially when Wurczinger discloses drive unit 19 to accomplish this function. Given that the Wurczinger reference itself is not obvious, Applicants respectfully submit that the combination of Wurczinger and Toki, and any motivation to combine, would not be obvious to a POSITA. Applicants submit that claims 11, 16 and 18 are thus allowable at least for this reason.

Based on the foregoing, Applicants respectfully submit that claims 11, 16 and 18 are valid and allowable. Claim 17 is thus allowable at least by virtue of depending from an allowable independent claim.

B. Toki Does Not Teach or Suggest Positioning the Liquid-Metal Connector “between the at least one bearing and the midpoint between the first end and the second end of the rotatable target” as Recited in Currently Amended Claim 19

The Office Action rejects claim 19 under 35 U.S.C. 102(b) as being anticipated by Japanese Patent Publication No. 01305523 (“Toki”). In order to clarify its patentably distinct features, claim 19 has been amended to recite positioning the liquid-metal connector “between the at least one bearing and the midpoint between the first end and the second end of the rotatable target”. Support for this amendment can be found in, at least, Figures 10-11 and paragraphs [0036] and [0042]-[0044] of the present application.

As discussed above, Applicants dispute that Toki’s bearing case 2 is the same as Applicants’ liquid-metal electrical connector. In the Office Action, Toki’s bearing case is

pointed to as teaching Applicants' liquid-metal connector. *See* Office Action, pp. 3 and 9. Applicants respectfully disagree. As described in paragraph [0036] of the present application, Applicants' liquid-metal connector "use[s] liquid metal, such as mercury, bonded to the contacts to form the electrical connection." This is different than Toki's bearing case 2 in which the liquid metal is pooled rather than bonded. This is evidenced by Toki's disclosures of a mercury feed valve 12 and a mercury discharge valve 13. Since claims 11, 16 and 18 all recite a liquid-metal connector, and since Toki does not disclose Applicants' liquid metal connector, claim 19 is believed to be valid and allowable.

Applicants further submit that the current amendments to claim 19 clarify its patentably distinct features. In the rejection of claim 19 the Office Action states that "Toki teaches the mercury (i.e. liquid-metal) connector is filled in the bearing case (i.e. shaft) that contains a bearing for pivoting an electrode..." Claim 19 has been amended to clarify that the liquid-metal connector is separate from the bearing, and located closer to the midpoint between the first end and the second end of the rotatable target. This is different than Toki. In Toki, a power supply 1 provides power to the entire bearing case 2. Instead of a separate power supply, Toki discloses the bearing case 2 as the power supply. For this reason, in addition to others, Applicants submit that independent claim 19 is valid and allowable.

IV. NEITHER WURCZINGER, BARRETT, NOR THE COMBINATION OF WURCZINGER AND BARRETT, TEACH, SUGGEST OR RENDER OBVIOUS THE POWER COUPLER POSITIONED INSIDE THE VACUUM CHAMBER

Claims 2 and 15 recite the power coupler positioned inside the vacuum chamber. The Office Action rejects claims 2 and 15 under 103(a) as obvious over Wurzinger in view of U.S. Patent No. 6,736,948 ("Barrett").

The Office Action states “it would have been obvious to one of ordinary skill in the art to place the power coupler inside the vacuum chamber as taught in Barrett for the apparatus in Wurczinger ... [and] would have a reasonable expectation of success in making such a modification.” Applicants respectfully disagree. First, Applicants submit that the Office Action does not set forth the required elements of a proper rejection under 35 U.S.C. 103. Under MPEP 706.02(j), the proposed modification of Barrett necessary to arrive at the claimed subject matter must be set forth in the Office Action. Applicants respectfully submit that this requirement has not been met and request the rejection be withdrawn. As discussed below, Barrett would have to be substantially redesigned in order to meet the requirements of claims 2 and 15 and the Office Action contains no proposed modifications. On this basis alone, Applicants request the rejections of claims 2 and 15 be withdrawn. Second, Applicants submit that even if Barrett and Wurczinger were combined that the combination would not meet each and every limitation of the claims. Therefore, Applicants further submit that claims 2 and 15 are valid and allowable.

Applicants submit that Barrett would have to be substantially redesigned in order to be combined with Wurczinger. However, the Office Action contains no proposed modifications to Barrett to reach this combination. MPEP 706.02(j). The Office Action states that a POSITA would place the power coupler inside the vacuum chamber as taught in Barrett for the apparatus in Wurczinger. Office Action p. 5. But Barrett does not disclose placing a power coupling located within the vacuum chamber, Barrett discloses moving the entire support, rotational mechanism, cooling system and power supply within the vacuum chamber. Barrett col. 5:36-46 and 10:43-11:15. Instead of simply being able to combine the power coupler in Barrett with the Wurczinger system, a POSITA would have to completely redesign Barrett to make the

combination. The Office Action provides no motivation to do so, and no proposal on how this could or would be done.

For example, as to claim 2, Barrett would have to be substantially redesigned in order to allow a shaft to pass through the Water Endblock, away from the target tube 362, and at least partially outside the vacuum chamber. Barrett Figures 6-8. This would require a complete redesign of the water endblock isolation housing (WEIH) 304 which currently blocks the path through the Water Endblock. But this redesign would impermissibly eliminate one of the intended purposes of Barrett, MPEP 2143.01, by eliminating some of the features and problems Barrett intends to address, such as the ability to absorb and accommodate imperfect axial rotation in both endblocks. *See, e.g.*, Barrett col. 5:45-46, 6:60-65, and 8:47-59. Moreover, since Wurczinger and Barrett disclose alternative methods for cooling the system, either Barrett or Wurczinger would have to be redesigned to eliminate those features. MPEP 2143.01.

Unlike Barrett and Wurczinger, the present invention discloses placing the power coupler inside the vacuum chamber while at the same time keeping some rotational components outside the vacuum chamber. Given the difficulties in modifying Barrett and Wurczinger to reach this result, and given the absence of any proposed modifications in the Office Action to accomplish the combination, Applicants respectfully submit that the present invention is novel and non-obvious.

Moreover, even if Barrett were completely redesigned, the combination of Barrett and Wurczinger would not meet the limitations of claims 2 and 15. For example, since claim 15 depends from 13, claim 15 includes the limitation that the power coupler be positioned closer, measured along the axis of the shaft, to a center of the vacuum chamber than the closest bearing. But Barrett does not meet this limitation. In fact, Barrett explicitly teaches the use of a ceramic

bearing for bearing 334 because “the current passes by inboard bearing 334 on a path to the target tube...” Rather than, as recited in claim 13, “positioning a power coupler to limit the current that flows through the at least one bearing,” inboard bearing 334 is positioned directly in the current path to the target tube. This does not meet the limitations of claim 15.

Wurczinger is not a prior art reference under 35 U.S.C. 102 or 103. In addition, the combination of Wurczinger and Barrett does not teach each and every limitation of claims 2 and 15, nor would a POSITA combine the two references. Applicants respectfully submit that claims 2 and 15 are therefore valid and allowable.

V. WURCZINGER DOES NOT TEACH OR SUGGEST EACH AND EVERY LIMITATION OF CLAIMS 3, 5, AND 10

Claims 3, 5, and 10 stand rejected under 35 U.S.C. 102(b) as being anticipated by Wurczinger. Applicants respectfully submit that Wurczinger does not teach the limitations disclosed in these claims.

A. Wurczinger Does Not Teach or Suggest an Integrated Rotatable Tube and Shaft

Claim 3 recites the rotatable tube and shaft are integrated. The Office Action points to the tube cathode 2 and the connection fitting 3 as corresponding to Applicants rotatable tube and shaft, respectively. First, the connection fitting 3 does not correspond to Applicants shaft. As shown in Figure 2, the connection fitting 3 surrounds the fluid tube 11 and fluid inflow 4 but is not a shaft. *See also* Wurczinger para. [0019]. Moreover, as shown in Figure 2 there is no connection between the connection fitting 3 and the tube cathode 2 in Wurczinger. Neither does Figure 2 or Figure 3 show any rotational connection between the components within the

connection fitting 3 and the vacuum chamber 1. Thus, Applicants respectfully submit this additional reason that Claim 3 is valid and allowable.

B. Wurczinger Does Not Teach or Suggest a Drive System Configured to Rotate the Shaft

Claim 5 recites a drive system configured to rotate the shaft. For this claim, the Office Action once again points to Wurczinger's connection fitting 3 as corresponding to Applicants' shaft. This is not correct. Moreover, as discussed above, Wurczinger provides no disclosure of any rotational connection between the components within the connection fitting 3 and the vacuum chamber 1. *See* Wurczinger Figures 2 and 3. While Wurczinger discloses the use of rotary drive unit 18 to rotate the tube cathode 2, there is no disclosure as to how this is accomplished. As Wurczinger also discloses a rotary drive unit 19 at the other end of the tube cathode 2, it is unclear as to whether Wurczinger can actually accomplish any rotation of the tube cathode via the drive unit 18. Thus, Applicants respectfully submit this additional reason that Claim 5 is valid and allowable.

C. Wurczinger Does Not Teach or Suggest a Power Coupler Comprising a Water-Cooled Slip Ring Connector

Claim 10 recites the *power coupler* comprising a water-cooled slip ring connector. The Office Action points to the fact that Wurczinger's tube cathode 2 is fluid cooled but provides no support that Wurczinger teaches or suggests "a water-cooled slip ring connector". The fact that Wurczinger cools the tube cathode is not the same as a *power coupler* comprising a water-cooled slip ring connector. Thus, Applicants respectfully submit this additional reason that Claim 5 is valid and allowable.

CONCLUSION

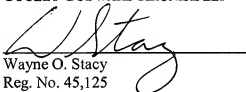
In view of the foregoing, Applicants respectfully submit that no further impediments exist to the allowance of this application and, therefore, solicits an indication of allowability. However, the Examiner is requested to call the undersigned if any questions or comments arise.

The Director is hereby authorized to charge any appropriate fees under 37 C.F.R. §§1.16, 1.17, and 1.21 that may be required by this paper, and to credit any overpayment, to Deposit Account No. 50-1283.

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